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CORRESPONDENCE

How quickly can conventional organism identification deliver reports for positive blood cultures in real life?

To the Editor,

Therapeutic options for bloodstream infections caused by resistant bacteria are limited, leading to "hit and missed" situations in which the initial antimicrobial therapy is ineffective against the infecting organisms.[1,2] Therefore, there has been increasing interest to implement new technologies such as matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS) for rapid organism identification.[3] Here, the computerized database from January 2012 to December 2012 in a clinical

Table 1 Time intervals for detection, identification, and reporting of pathogens in blood cultures

	n	% of positive recovery within		Hours (mean ± SD)		
		24 h	48 h	TTP	TTI	TAT
Microorganism						
Enterobacteriaceae	570	94.0	98.4	14.3 ± 10.5	49.3 ± 27.1	63.6 ± 30.0
Bacillus	155	75.5	93.5	21.4 ± 15.9	44.1 ± 19.5	65.5 ± 26.5
CoNS	120	46.7	90.8	29.0 ± 13.5	55.9 ± 18.8	84.9 ± 22.4
Staphylococcus aureus	81	96.3	100.0	15.9 ± 5.2	48.4 ± 13.7	64.2 ± 14.0
Streptococci	78	87.2	97.4	17.6 ± 12.5	80.8 ± 81.1	98.4 ± 84.0
Anaerobes	56	28.6	60.7	52.5 ± 46.5	127.4 ± 89.4	179.9 ± 112.2
Pseudomonas	43	93.0	97.7	19.4 ± 11.2	45.9 ± 17.0	65.3 ± 18.1
Other Gram negative	36	55.6	88.9	25.1 ± 18.1	88.2 ± 85.2	113.3 ± 93.5
Enterococci	27	92.6	100.0	16.3 ± 5.5	76.1 ± 25.5	92.5 ± 28.0
Other Gram positive	22	27.3	77.3	37.5 ± 21.0	88.4 ± 65.4	126.0 ± 68.4
Yeast	22	18.2	68.2	43.9 ± 21.9	78.2 ± 55.8	122.1 ± 55.9
Acinetobacter	11	81.8	81.8	22.9 ± 21.9	64.8 ± 45.2	87.8 ± 55.8
All isolates	1221	79.9	94.0	20.3 ± 18.3	57.8 ± 44.4	78.1 ± 52.7
MDRO[a]						
Yes	192	92.2	97.9	15.6 ± 11.4	54.0 ± 40.9	69.7 ± 43.6
No	1029	77.6	93.3	21.2 ± 19.2	58.5 ± 45.0	79.6 ± 54.1
Patient outcome						
Survived	989	81.3	94.2	19.9 ± 16.8	56.1 ± 41.8	76.0 ± 49.3
Died (Day 30)	232	73.7	93.1	22.1 ± 23.6	64.9 ± 53.8	87.0 ± 64.7

CoNS = coagulase negative *Staphylococcus*; MDRO = multidrug-resistant organism; MRSA = methicillin-resistant *Staphylococcus aureus*; TAT = turnaround time; TTI = time to identification; TTP = time to positivity.

[a] Including 165 multidrug-resistant Gram-negative bacilli, 25 MRSA, one vancomycin-resistant *Enterococcus*, and one vancomycin-resistant *Pediococcus*.

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microbiology laboratory for blood cultures was used to assess how the turnaround time might be affected by the implementation of MALDI-TOF technologies for rapid organism identification.

During the study period, the BACTEC FX system (BACTEC Plus Aerobic/F Medium, BACTEC Lytic/10 Anaerobic/F Medium, and BACTEC Myco/F Lytic Medium; Becton Dickinson, Franklin Lakes, NJ, USA) was used for the culture of blood samples. Positive blood cultures were subjected to direct Gram smear and plating out on solid media, followed by organism identification with conventional methods, primarily by the VITEK 2 (bioMérieux, Marcy l'Etoile France). The results including the final identification and antimicrobial susceptibility are reported through the laboratory information system (LIS). The time to positivity (TTP) is the time from the start of incubation to the alert signal. The time to identification (TTI) is the time from culture positivity to the reporting time, as documented in the LIS. Turnaround time (TAT) is the sum of TTP and TTI.

A total of 1221 adult patients (age $\geq$18 years) with positive blood cultures that grew a single microorganism were included (Table 1). Overall, the percentage of positive recovery in 24 hours and 48 hours were 79.9% (976/1221) and 94.0% (1148/1221), respectively. The mean TTP and TTI were 19.0 $\pm$ 18.9 hours and 58.6 $\pm$ 45.4 hours, respectively. With the exception of anaerobes, the mean TTP for all the organism groups were within 24—48 hours. Following positive blood culture, 83.2% (1016/1221) of the organisms were identified and reported within 3 working days. The proportions of positive blood cultures that could be reported within 48 hours, 72 hours, and 96 hours of blood culture drawn were 17.9%, 64.2%, and 83.8%, respectively. The crude mortality of the patients at Day 30 was 19% (232/1221). Among the patients who died, the final organism identifications were reported after the deaths of patients in 34.9% (81/232).

This study demonstrated that in real life, there is often a delay of 3—4 days between the blood cultures drawn and the availability of results. With the direct performance of MALDI-TOF MS on positive blood culture broths, which only require approximately 2 hours to complete,[3] it is predicted that organism identification within 48 hours of blood culture drawn could be potentially increased from <20% to >90%. This could improve the appropriateness of antibiotic treatment, reducing patient mortality, and decreasing length of stay, especially when this is applied in combination with antimicrobial stewardship team intervention.[4,5] Given the high burden of antimicrobial resistance in Asian countries, there is an urgent need for laboratories to consider a change in approaches for organism identification.

Conflict of interest

Nothing to declare.

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